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(54) MOLDED PRODUCT AND PRODUCTION THEREOF**(57)Abstract:**

PURPOSE: To obtain an integrated molded product excellent in the sealability of a material of a different kind using a thermoplastic resin excellent in moldability.

CONSTITUTION: A crosslinkable compsn. (1) such as a thermosetting compsn., a photo-setting compsn. or an electron beam curable compsn. is applied to the contact scheduled part of a thermoplastic resin and crosslinked by the method corresponding to the compsn. to be cured or a soln. of a rubbery polymer (2) such as saturated polyolefinic rubber, α -olefin/diene rubber, a polystyrenic thermoplastic elastomer or a polyolefinic thermoplastic elastomer is applied to the contact scheduled surface to volatilize a solvent or the rubbery polymer is melted to be applied to the contact scheduled surface to be cooled to produce a material of a different kind having an intermediate layer formed thereto, for example, an electronics element such as a light emitting diode. This material is fixed to a mold and a thermoplastic resin such as polycarbonate, polymethyl methacrylate or a thermoplastic norbornene resin is subjected to injection molding and solidified to obtain an integrated molded product.

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CLAIMS

[Claim(s)]

[Claim 1] Mold goods which are really which consists of a thermoplastics part and a dissimilar-material part mold goods, cooled the thermoplastics fused in metal mold, and the dissimilar material in which the interlayer was formed on the front face embedded at it, and solidified thermoplastics.

[Claim 2] Mold goods according to claim 1 which are what a dissimilar-material part becomes from a metal or ceramics.

[Claim 3] Claim 1 whose interlayer is a cross-linking polymer layer, or mold goods given in two.

[Claim 4] Claim 1 whose interlayer is a gum polymer layer, or mold goods given in two.

[Claim 5] Claims 1 and 2 which are what an interlayer becomes from thermosetting resin, electron ray hardenability resin, or a photo-setting resin, or mold goods given in three.

[Claim 6] Claims 1 and 2 which are what the middle class becomes from saturation polyolefine system rubber, alpha olefin diene copolymer system rubber, polystyrene system thermoplastic elastomer, or polyolefine system thermoplastic elastomer, or mold goods given in four.

[Claim 7] Any of claims 1-6 whose dissimilar-material parts are electronics components, or mold goods of a publication.

[Claim 8] Claims 1, 2, 3, and 5 which fix to metal mold the dissimilar-material part in which the cross-linking polymer layer was formed to the contact schedule side with a thermoplastics part, and carry out injection molding of the thermoplastics, or the manufacture approach of mold goods given in seven.

[Claim 9] Claims 1, 2, 4, and 6 which fix to metal mold the dissimilar-material part in which the gum polymer layer was formed to the contact schedule side with a thermoplastics part, and carry out injection molding of the thermoplastics, or the manufacture approach of mold goods given in seven.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the thermoplastics mold goods which connote dissimilar materials, such as a metal and ceramics, and its manufacture approach.

[0002]

[Description of the Prior Art] The electronics component, such as IC component and light emitting diode, consists of a metal and ceramics. Therefore, it may deteriorate [oxidize] by contact with the oxygen in air, moisture, etc. Therefore, generally, it closes and an electronics component is used so that direct air etc. may not be contacted.

[0003] Generally in manufacture of such an electronics component closure object, the component is closed using an epoxy resin. However, since an epoxy resin was thermosetting resin, it required time amount for hardening by bridge formation, and had the problem that production time became long. Compaction of the time amount which the closure takes was desired for improvement in manufacture effectiveness.

[0004] Recently, the approach which the research which replaces with thermosetting resin and uses thermoplastics as a sealing agent is progressing, for example, closes an electronics component using the addition mold copolymerization resin of norbornene and olefins is proposed (JP,2-31451,A). Although the time amount which shaping takes the approach using thermoplastics as a sealing agent is excellent in the short point, there is a problem of the closure nature of a dissimilar material being inadequate, and being easy to produce interfacial peeling by the difference in the magnitude of expansion and contraction of the dissimilar material by the temperature change and a sealing agent. For this reason, air and moisture might advance between the sealing agent and the dissimilar material, the dissimilar material might be contacted, and the dissimilar material might cause oxidation etc.

[0005]

[Problem(s) to be Solved by the Invention] Aiming at development of shaping, this invention persons find out attaining the above-mentioned purpose by forming an interlayer in the contact surface with the thermoplastics of a dissimilar material as a result of efforts, and really [excellent in the closure nature of the dissimilar

material which uses thermoplastics] came to complete this invention wholeheartedly.

[0006]

[Means for Solving the Problem] In this way, according to this invention, it is really which consists of a thermoplastics part and a dissimilar-material part mold goods, and the thermoplastics fused in metal mold and the dissimilar material in which the interlayer was formed on the front face embedded at it are cooled, and the mold goods which solidified thermoplastics, and its manufacture approach are offered.

[0007] (Thermoplastics) Especially the thermoplastics used for this invention is not limited, for example, a polycarbonate, polymethylmethacrylate, poly ethyl terephthalate, poly butyl terephthalate, polyimide, a polyamide, diallyl phthalate, a chlorinated polyether, poly amino bismaleimide, polysulfone, silicon resin, thermoplastic norbornene system resin, etc. are mentioned.

[0008] It is desirable to have the thermal resistance according to the purpose of use etc. and the moisture resistance of thermoplastics of this invention, and especially glass transition temperature is not limited, either. The glass transition temperature which is easy to carry out injection molding is desirable. In the case of an electronics component, the part may solder the metal part jutted out of the thermoplastics part outside, and the closure was carried out [the part] into thermoplastics by heat conduction from a metal part may be heated. In such a case, that whose glass transition temperature of polyimide etc. is 260-degree-C or more extent is desirable. However, if moisture exists, when the dissimilar material by which the closure was carried out to thermoplastics will be easy to be eaten away, moisture is made to penetrate and the thermoplastic norbornene system resin which is hard and cannot absorb moisture easily is desirable.

[0009] (Thermoplastic norbornene system resin) The thermoplastic norbornene system resin of this invention is resin well-known at JP,3-14882,A, JP,3-122137,A, JP,4-63807,A, etc., and, specifically, the ring-opening-polymerization object of a norbornene system monomer, its hydrogenation object, the addition mold polymer of a norbornene system monomer, a norbornene system monomer, the addition mold polymer of an olefin, etc. are mentioned.

[0010] A norbornene system monomer is also a monomer well-known at the above-mentioned official report, JP,2-227424,A, JP,2-276842,A, etc. For example, norbornene, its alkyl, alkylidene, an aromatic substitution derivative and these permutations, or the halogen of an unsubstituted olefin, A hydroxyl group, an ester group, an alkoxy group, a cyano group, an amide group, an imide radical, Polar-group substitution products, for example, 2-norbornene, such as a silyl radical, 5-methyl-2-norbornene, 5 and 5-dimethyl-2-norbornene, 5-ethyl-2-norbornene, 5-butyl-2-norbornene, 5-ethylidene-2-norbornene, 5-methoxycarbonyl-2-norbornene, 5-cyano-2-norbornene, 5-methyl-5-methoxycarbonyl-2-norbornene, 5-phenyl-2-norbornene, 5-phenyl-5-methyl-2-norbornene, 5-hexyl-2-norbornene, 5-octyl-2-norbornene, 5-octadecyl 2-norbornene, etc.; The monomer which one or more cyclopentadienes added to norbornene, The same derivative and same substitution product as the above, 1 [for example,], 4:5, 8-dimethano - 1, 2, 3, 4, 4a, 5, 8, 8a-2, 3-cyclopentadieno naphthalene, The 6-methyl -1, 4:5, 8-dimethano - 1, 4,a [4], 5, 6, 7, 8, and 8a-octahydronaphthalene, 1, 4:5, 10:6, 9-trimethano -

1, 2, 3, 4,a [4], 5,a [5], 6, 9,a [9], 10, and 10a-dodeca hydronalium -2, 3-cyclopentadieno anthracene, etc.; A monomer, the same derivative and same substitution product as the above of the polycyclic structure which is the polymer of a cyclopentadiene, For example, a dicyclopentadiene, 2, a 3-dihydrodicyclopentadiene, etc.; The addition product of a cyclopentadiene, a tetrahydro indene, etc., The same derivative and same substitution product as the above, 1 [for example,], 4-methano - 1, 4, 4a, 4b, 5, 8, 8a, a 9a-octahydro fluorene, 5, the 8-methano -1, 2, 3, 4, 4a, 5 and 8, 8a-octahydro -2, 3-cyclopentadieno naphthalene, etc.; etc. -- it is mentioned.

[0011] In addition, when carrying out the polymerization of the norbornene system monomer in this invention, in the range which does not bar the effectiveness of this invention substantially, other cycloolefins in which a polymerization is possible can be used together, and it can consider as a copolymer. The compound which a cyclopentene, cyclooctane, 5, and 6-dihydrodicyclopentadiene etc. solves, and has one or more reactant double bonds, for example as an example of the cycloolefin in which the copolymerization in the case of ring opening polymerization is possible is illustrated.

[0012] A well-known approach may be used for the polymerization of a norbornene system monomer, and it may be used as thermoplastic norbornene system hydrogenation resin by being a well-known approach and hydrogenating if needed.

[0013] Moreover, Tg is desirable and 100 degrees C or more of 120 degrees C or more of thermoplastic norbornene system resin used by this invention are a thing 130 degrees C or more especially preferably more preferably. GPC (gel permeation chromatography) according [number average molecular weight] to a toluene solvent -- the polystyrene reduced property measured by law -- it is -- 10,000-200,000 -- desirable -- 20,000-100,000 -- it is 25,000-50,000 more preferably. When number average molecular weight is too small, a mechanical strength is inferior, and if too large, a moldability will worsen.

[0014] In addition, when hydrogenating thermoplastic norbornene system resin, the rate of hydrogenation is more preferably made into 99% or more 95% or more 90% or more from viewpoints, such as heat-resistant degradation nature and photodegradation-proof nature.

[0015] Moreover, in a norbornene system ring-opening-polymerization object hydrogenation object, inorganic bulking agents, such as an antioxidant, light stabilizer-proof, an ultraviolet ray absorbent, a flexible grant agent, a plasticizer, a tackifier, a coloring agent, lubricant, a filler, carbon black, white carbon (silicic-acid compound), a calcium carbonate, talc, and clay, and other additives may be added if needed.

[0016] (Dissimilar material) what fuses the dissimilar material used for this invention with the molding temperature of the thermoplastics used by this invention, or does not deform -- it is -- ****ing -- especially -- metals, such as gold, silver, copper, platinum, and aluminum, these alloys; Ceramics, such as silicon oxide, an aluminum oxide, and silicon; etc. -- what combined these is good and what is used for the semiconductor chip of electronic parts, such as a light emitting diode, diode, a transistor, and an integrated circuit, especially is desirable.

[0017] These are beforehand fabricated in the configuration in the inside of the

mold goods of this invention. What is necessary is not to limit especially the shaping approach of a dissimilar material, but just to fabricate it according to each purpose. What is necessary is just to fabricate by the approach used with the electronics component of vapor-depositing on the case of an electronics component, for example, a metal frame.

[0018] The interlayer who uses by this invention consists of a cross-linking polymer or a gum polymer. An interlayer may make it a multilayer. As for an interlayer's thickness, it is desirable to make it 10mm or less on the whole, and it is more desirable to make it about 0.001-5mm. In the case of minute mold goods, like an electronics component closure object, it is desirable that it is about 0.001-1mm.

[0019] (Cross-linking polymer) Heat deflection temperature of a thing (150 degrees C or more and 200 more degrees C or more) is [that the cross-linking polymer used for this invention should just be what fuses with the molding temperature of the thermoplastics which is excellent in thermal resistance among the thermosetting resin which carried out bridge formation hardening, a photo-setting resin, electron ray hardenability resin, etc., and uses cross-linking constituents, such as a thermosetting constituent, a photoresist constituent, and an electron ray hardenability constituent, by this invention, or does not deform] especially desirable 100 degrees C or more by the 18.6kg/cm² load.

[0020] As thermosetting resin, polystyrene resin besides the thing of acrylic [silicon resin / phenol resin, xylene resin diallyl phthalate resin, an unsaturated polyester resin, an epoxy resin, acrylic resin, furan resin, aniline resin, polyurethane resin, a polybutadiene resin, a melamine phenolic resin,] and the thing of an epoxy system, polyolefin resin, etc. are mentioned as electron ray hardenability resin, and an acrylic thing etc. is mentioned as a photo-setting resin. The cure rate by bridge formation is quick, and especially a photo-setting resin is desirable at the point which can increase the efficiency of a process.

[0021] Moreover, the good thing of the closure nature of a dissimilar material of a cross-linking polymer is desirable. If the layer of such a cross-linking polymer is formed in a dissimilar-material front face and it will not be based on a remarkable temperature change, it does not deteriorate with the air or moisture which advanced into the interface part into which interfacial peeling did not happen by the difference in the magnitude of expansion and contraction of both, and the dissimilar-material front face exfoliated. In the case of a metal or ceramics, the closure nature of a dissimilar material of these dissimilar materials is good, and an epoxy resin and its acrylic resin are desirable.

[0022] Furthermore, the thing over which a monofunctional acrylate monomer, 2 or 3 organic-functions acrylate monomer, the acrylate monomer of four or more organic functions, and the ultraviolet-rays hardenability constituent that consists of a photopolymerization initiator were made to construct a bridge especially as ultraviolet-rays hardenability resin also in the acrylic photo-setting resin excellent in two points of the closure nature of simplification of a process and dissimilar materials, such as a metal, is desirable.

[0023] In this invention, what has an acrylate radical among photopolymerization nature monomers is called a monofunctional acrylate monomer, 2 organic-

functions acrylate monomer, 3 organic-functions acrylate monomer, etc. with the number of acrylate radicals. Moreover, in this invention, an acrylate radical contains a methacrylate radical, an ETAKURI rate radical, etc. other than an acrylate radical in a narrow sense.

[0024] As a monofunctional acrylate monomer, n-butyl acrylate, isoamyl acrylate, 2-hydroxyethyl methacrylate, 2-hydroxypropyl methacrylate, 2-ethylhexyl methacrylate, phenoxy ethyl acrylate, phenoxypropylacrylate, other high-class alkyl acrylate, etc. are mentioned, for example. Especially, in order to decrease hardening contraction of ultraviolet-rays *****, what has a with a carbon number of about four to six side chain is desirable [what does not have a methacrylate radical etc. but has only an acrylate radical in a narrow sense is desirable, and], so that a hardening reaction may not be checked by radical oxygen.

[0025] As 2 or a 3 organic-functions acrylate monomer, 2 or three acrylic acids esterify to polyols, such as ethylene glycol, a diethylene glycol, tripropylene glycol, a butylene glycol, neopentyl glycol, hexandiol, a TOREMECHIRORU propane, tetramethylol propane, a PENTA ERIS toll, and dipentaerythritol, for example.

[0026] As an acrylate monomer of four or more organic functions, 4-8 acrylic acids esterify preferably to four or more polyols, such as tetramethylol propane, a PENTA ERIS toll, and dipentaerythritol, for example. Especially generally the acrylate monomer of four to 6 organic functions with easy acquisition is desirable.

[0027] As a photopolymerization initiator, a 2 and 2-dimethoxy-2-phenyl acetophenone, Acetophenones, such as 2 and 2-diethoxy acetophenone and a chlorination acetophenone; Benzophenones; [Benzyl,] Benzoin, such as methyl orthochromatic benzoyl benzoate and benzoin alkyl ether; alpha and alpha'-azobisisobutyronitril, Azo compounds, such as a 2 and 2'-azobis propane and a hydrazone; Benzoyl peroxide, organic peroxide, such as JITA challis butyl peroxide; Diphenyl disulfide groups, such as diphenyl disulfide, dibenzyl disulfide, and dibenzoyl disulfide; etc. -- it can mention.

[0028] A monofunctional acrylate monomer is [25 - 40 weight section and the photopolymerization initiator of 2 or 3 organic-functions acrylate monomer] 2 - 6 % of the weight one to 10% of the weight 15 to 30% of the weight ten to 40% of the weight 30 to 40% of the weight preferably 25 to 60% of the weight to the weight with which these mixed rates usually doubled the acrylate monomer and the photopolymerization initiator 20 - 50 % of the weight of acrylate monomers of four or more organic functions. If there are too many acrylate monomers of four or more organic functions, hardening contraction will increase, if too few, the degree of hardness of the cross-linking polymer after hardening will fall, and a cure rate falls. When there are few amounts of a monofunctional acrylate monomer, viscosity becomes high and workability is bad. Moreover, if there are many amounts of a monofunctional acrylate monomer, hardening contraction will decrease, and also the amount of 2 or 3 organic-functions acrylate monomer decreases, the flexibility of the cross-linking polymer after hardening falls, and it becomes the cause of crack initiation. Moreover, in order to raise closure nature, many things of the amount of 2 or 3 organic-functions acrylate monomer are desirable.

[0029] Furthermore, as long as the closure nature and the degree of hardness of a cross-linking polymer layer are filled, the suitable additive for a cross-linking

constituent may be added. For example, by adding a suitable surfactant, for example, a non-ion system activator with sufficient compatibility with an ultraviolet-rays curing agent, especially an amine system surfactant, and other antistatic agents, surface electrification nature etc. is improvable, or by adding a fluorine system nonionic surface active agent, it gets wet as a substrate and the surface smooth nature after ***** can be improved. Moreover, by adding suitable thermoplastics, viscosity can be adjusted or closure nature can also be raised. As thermoplastics which raises closure nature, petroleum resin or its hydrogenation objects, such as a ring-opening-polymerization object of thermoplastic saturation norbornene system resin or resin with similar it and structure, for example, a norbornene system monomer, and a dicyclopentadiene system, a diene system, an aliphatic series system, a water white system, etc. are mentioned.

[0030] Although such mixture can also be used as a cross-linking constituent as [this] The need for operability etc. is accepted and they are aromatic hydrocarbons solvents, such as toluene, a xylene, and chlorobenzene.; Cyclohexane, Alicycle group hydrocarbon system solvents, such as a methylcyclohexane; Methyl isobutyl ketone, ketones, such as a methyl ethyl ketone and an acetone; Ethers solvents, such as n-butyl ether and diethylether; etc. -- it may begin, and you may dissolve and use for 80% of the weight or more of concentration at an ester solvent, a cellosolve system solvent, the Krol system solvent, etc.

[0031] When the coefficient of linear expansion of the dissimilar material and thermoplastics which are used for this invention differs greatly, interfacial peeling etc. may be started from the difference in both expansion by the operating environment of the mold goods of this invention, and, in such a case, it is desirable to use the cross-linking constituent which has flexibility after bridge formation.

[0032] Moreover, a polymerization initiation assistant, a defoaming agent, a filler, a pigment, UV stabilizer, an ultraviolet ray absorbent, an antioxidant, a heat-resistant stabilizer, a tackifier, a flexible grant agent, etc. may be added and used for this cross-linking constituent.

[0033] Especially the approach of applying a cross-linking constituent to a contact schedule side with the thermoplastics part of a dissimilar material is not limited. For example, dipping, blasting, brush coating, a spin coat, etc. are raised. What is necessary is just to choose in accordance with simplification and the precision demanded of a process. When the organic solvent is included in the cross-linking constituent in the case of spreading, it must fully remove before bridge formation to extent which does not become causes, such as cracking and corrosion of a dissimilar material, after shaping. It is desirable to adjust and use viscosity by the approach of adjusting the amount of monomers, without using an organic solvent.

[0034] Processing suitable for making each cross-linking constituent construct a bridge is carried out, the dissimilar material which applied this cross-linking constituent is made to construct a bridge, and a cross-linking polymer layer is formed in it.

[0035] (Gum polymer) The glass transition temperature of especially the gum polymer used for this invention is a thing 40 degrees C or less. Although a certain case has two or more glass transition temperature with the gum polymer which

carried out block copolymerization, if the in that case lowest glass transition temperature is 40 degrees C or less, the glass transition temperature of this invention can use as a gum polymer 40 degrees C or less. When the interlayer who consists of such a gum polymer is formed in a dissimilar-material front face, a gum polymer may fuse by contact to the fused thermoplastics, but it is not isolated from the front face of a dissimilar material in the state of melting, but a gum polymer is also solidified with solidification by cooling of thermoplastics, and since the reconstitution of the interlayer is carried out, it does not become a problem.

[0036] As a gum polymer of this invention, ethylene propylene rubber, ethylene and an alpha olefin copolymer, Saturation polyolefine system rubber, such as a propylene and an alpha olefin copolymer, chlorinated polyethylene, and chlorosulfonated polyethylene; Ethylene propylene diene copolymer, An alpha olefin diene copolymer, an ethylene diene copolymer, a propylene diene copolymer, Alpha olefin diene copolymer system rubber, such as these halogenides and a hydrogenation object; Polyisoprene rubber, Diene polymer system rubber, such as butadiene rubber, these halogenides, and a hydrogenation object; Methyl silicone rubber, Silicone system rubber, such as vinyl methyl silicone rubber and Phi Nils methyl silicone rubber; Silicone rubber fluoride Fluorine system rubber, such as vinylidene fluoride rubber, tetrafluoroethylene propylene rubber, and tetrafluoroethylene perfluoromethylvinylether rubber; Styrene butadiene copolymer, Styrene diene copolymer system rubber, such as a styrene isoprene copolymer; Isobutylene isoprene rubber, Butyl system rubber, such as the halogenide and a hydrogenation object; Chloroprene, Chloroprene system rubber, such as the halogenide and a hydrogenation object; Epichlorohydrin rubber, Epichlorohydrin system rubber, such as epichlorohydrin ethylene oxide rubber; Polyether polyurethane rubber, Urethane system rubber, such as polyester polyurethane rubber; Acrylonitrile-butadiene rubber, Acrylonitrile butadiene system rubber, such as the halogenide and a hydrogenation object; Carboxylation nitrile rubber, Carboxylation nitril system rubber, such as the halogenide and a hydrogenation object; A norbornene system monomer and ethylene copolymer rubber, A norbornene system monomer and alpha olefin copolymer rubber, a norbornene system monomer, ethylene and alpha olefin copolymer rubber, Norbornene system rubber, such as norbornene system monomer ring-opening-polymerization object rubber, these HAROBEN ghosts, and a hydrogenation object; Acrylic rubber, Acrylic rubber, such as ethylene-acrylic rubber; Styrene styrene-butadiene-rubber block copolymer, A styrene isoprene styrene block copolymer, a styrene ethylene styrene-butadiene-rubber block copolymer, A styrene isoprene styrene-butadiene-rubber block copolymer, Styrene ethylene propylene styrene block copolymers, these halogenides, Polystyrene system thermoplastic elastomer, such as a hydrogenation object; The blend object of olefine resin and olefin rubber, The blend objects of olefine resin and an olefin diene copolymer, these halogenides, polyolefine system thermoplastic elastomer, such as a hydrogenation object; Polyurethane system thermoplastic elastomer; Thermoplastic elastomer polyester; Thermoplastic elastomer polyamide; etc. -- it is illustrated.

[0037] As a gum polymer used for this invention, the saturation polyolefine system rubber from the point of thermal resistance and weatherability, alpha olefin diene

copolymer system rubber, polystyrene system thermoplastic elastomer, and polyolefine system thermoplastic elastomer are desirable, polystyrene system thermoplastic elastomer is more desirable, and especially the polystyrene system thermoplastic elastomer that is a hydrogenation object is desirable.

[0038] In a gum polymer, additives, such as inorganic bulking agents, such as an antioxidant, light stabilizer-proof, a flame retarder, a defoaming agent, glass fiber, and a glass bead, may be added if needed.

[0039] In this invention, a gum polymer solution is applied and a solvent is volatilized, or a gum polymer is fused, and it applies, it cools on a dissimilar-material front face, and a gum polymer layer is formed in it. If a solvent reacts with a dissimilar material, or is not eaten away and a gum polymer is dissolved when applying a solution, it will not be limited especially. For example, in the case of polystyrene system thermoplastic elastomer, toluene, a cycloolefin, etc. are used. Especially concentration is not limited. What is necessary is just to make it the good concentration of workability according to the class of gum polymer to be used, and the method of application, when making a gum polymer layer into suitable thickness. Especially the method of application is not limited, either but a spray, brush coating, dipping, a spin coat, etc. can be used. Especially the desiccation approach is not limited, either but stoving, reduced pressure drying, heating reduced pressure drying, etc. can be used. For compaction of the process time amount which is one of the effectiveness of this invention, heating reduced pressure drying is desirable. In order not to make it foam, it is desirable after spreading to prepare ***** for about 5 - 10 minutes. Moreover, when applying a melting gum polymer, the melting gum polymer of the temperature which does not deteriorate a dissimilar material is applied.

[0040] (The shaping approach) The mold goods of this invention are really which consists of a thermoplastics part and a dissimilar-material part mold goods, cool the thermoplastics fused in metal mold, and the dissimilar material in which the interlayer was formed on the front face embedded at it, and solidify and fabricate thermoplastics. Generally the dissimilar material in which the interlayer was formed on the front face is fixed in metal mold, and insert molding which injects and fabricates the fused thermoplastics in metal mold is performed using an injection molding machine. After making it deform in the process which thermoplastics solidifies, or embedding a dissimilar material and solidifying, you may paste up with polish, cutting, and other mold goods.

[0041] Moreover, when it is the purpose to close a dissimilar-material part with thermoplastics, it usually fabricates so that a dissimilar material may be buried into thermoplastics. For example, when closing a semi-conductor etc., the whole semi-conductor which is a dissimilar-material part is covered with an interlayer, and it fabricates so that it may be buried into thermoplastics. The lead wire linked to a semi-conductor etc. is usually the matter which cannot deteriorate easily due to oxygen or moisture, and the lead wire itself does not need to be covered with an interlayer in that case. Since it cannot energize with a wrap by the interlayer completely to the end of the lead wire of the part which is not closed with thermoplastics rather when closing a semi-conductor etc., it is not desirable. Although it is desirable that the lead wire of a semi-conductor and a close part is

covered by the interlayer about the part by which the closure is carried out, the whole lead wire by which the closure is carried out does not need to be covered with an interlayer. Similarly, about the lead wire of the part by which the closure is not carried out, in order to make it energize, there is a part which is not covered with an interlayer. Lead wire makes preferably especially the part covered with the norbornene system ring-opening-polymerization object hydrogenation object the thickness of 0.08mm or more 0.05mm or more 0.01mm or more except for the part projected outside.

[0042] (Application) electronics component closure object which closed electronics components, such as an LSI component, IC component, an LED component, and a CCD component, as mold goods of this invention; Electronic-parts closure object which closed electronic parts, such as a capacitor, a resistor, a coil, a microswitch, a DIP switch, and a connector; etc. -- others -- the taper mold flowmeter which inserted the hub for magneto-optic disks and the connector can be illustrated.

[0043]

[Example] An example and the example of a comparison are raised to below, and this invention is explained still more concretely. In addition, the closure sex test and a thermo-cycle trial were performed as follows.

[0044] (Closure sex test) After being immersed in the red ink (INK RED, pilot incorporated company make) 20% water solution and boiling closure light emitting diode for 1 hour, ejection and a surface red ink water solution were wiped off, and it observed visually.

[0045] The temperature change was given to closure light emitting diode for (thermo-cycle trial) -30 degree C and, and 30 minutes by making 100 degree C and 30 minutes into 1 cycle.

[0046] Example 1 metal leadframe (EME 2003-2, Enomoto Make), The acrylic constituent (the n-butyl acrylate 10 weight section, the isoamyl acrylate 28 weight section, the trimethylolpropane triacrylate 30 weight section, dipentaerythritol hexa chestnut rate 42 weight section, photopolymerization initiator (Ciba-Geigy make, IRUGAKYUA 651) 5 weight section) was applied so that the closure of the light emitting diode chip (20mA of rated currents) which consisted of a semi-conductor PN-junction child and a gold streak might be carried out completely, and it was left at the room temperature for 10 minutes, and fully dried. The thickness of the acrylic constituent after desiccation was 0.1mm on the average. UV irradiation (peak exposure reinforcement on a substrate front face: 150 mW/cm², addition quantity of light 150 mJ/cm², irradiation time 10 seconds) by the 80mW high-pressure mercury lamp was performed, and the bridge was constructed in the acrylic constituent.

[0047] It fixes in metal mold so that the closure of the part closed by this crosslinked polymer may be carried out further, and it is a norbornene system ring-opening-polymerization object hydrogenation object (ZEONEKKUSU 280, Tg140 degree C, number average molecular weight 28,000 [about], Nippon Zeon Co., Ltd. make) to metal mold. Injection molding was carried out using the injection molding machine (punch immobilization, a female mold ejector half, a ** type injection molding machine, Sanjo Seiki Co., Ltd., SAV-30/30 mold) by 2g/second in the resin temperature of 300 degrees C, the die temperature of 100 degrees C, injection-

pressure 25 kgG/cm², and injection-molding rate, and 100 closure light emitting diodes were obtained. The layer of a norbornene system ring-opening-polymerization object hydrogenation object was 0.20mm in the thinnest part, when the closure part and non-closure part of a metal leadframe were removed.

[0048] With all closure light emitting diodes, the closure of the hardened surface resin layer was carried out into thermoplastic norbornene system resin. When energized, all closure light emitting diodes emitted light normally.

[0049] Penetration inside [of red ink] a closure object was accepted with no closure light emitting diodes as a result of the closure sex test.

[0050] After the thermo-cycle trial of 50 cycles, when energized, all closure light emitting diodes emitted light normally.

[0051] Although the penetration from the part of a metal leadframe inside [of red ink] a closure object was accepted with two closure light emitting diodes when the closure light emitting diode after the thermo-cycle trial of 50 cycles was again covered over the closure sex test, penetration inside a cross-linking polymer layer was not accepted.

[0052] Furthermore, corrosion etc. was not especially accepted although the metal leadframe of the part by which the closure is carried out to thermoplastic norbornene system resin and a cross-linking polymer at the duplex was investigated.

[0053] As an example 2 cross-linking polymer, it processed like the example 1 using what added the 2-methyl hexahydro phthalic anhydride 90 weight section to the bisphenol female mold epoxy resin (XPY-306, Ciba-Geigy Japan make) 100 weight section instead of the acrylic constituent except leaving it at 120 degrees C for 15 hours instead of irradiating ultraviolet rays as hardening processing.

[0054] The thickness of the epoxy system resin layer which constructed the bridge was 0.10mm in the thinnest part, when the layer of 0.18mm and a norbornene system ring-opening-polymerization object hydrogenation object removed the closure part and non-closure part of a metal leadframe on the average.

[0055] When energized, all closure light emitting diodes emitted light normally.

[0056] Penetration inside [of red ink] a closure object was accepted with no closure light emitting diodes as a result of the closure sex test.

[0057] After the thermo-cycle trial of 50 cycles, when energized, all closure light emitting diodes emitted light normally.

[0058] Although the penetration from the part of a metal leadframe inside [of red ink] a closure object was accepted with five closure light emitting diodes when the closure light emitting diode after the thermo-cycle trial of 50 cycles was again covered over the closure sex test, penetration inside a cross-linking polymer layer was not accepted.

[0059] Furthermore, corrosion etc. was not especially accepted although the metal leadframe of the part by which the closure is carried out to thermoplastic norbornene system resin and a cross-linking polymer at the duplex was investigated.

[0060] The spray was used as a gum polymer solution, the 10-% of the weight toluene solution of a styrene ethylene styrene-butadiene-rubber block-copolymer hydrogenation object (the Asahi Chemical make, tough tech M1911) was applied at

the same light emitting diode chip as example 3 example 1, it dried for 50 minutes with 40 degrees C and 0.5 atmospheric pressures after neglect with the room temperature for 10 minutes, and the gum polymerization body whorl was formed in the light emitting diode chip front face. The thickness of a gum polymer layer was 5 micrometers on the average.

[0061] It fixed in metal mold so that the closure of the part in which this gum polymer layer was formed might be carried out, and injection molding was carried out to metal mold on the same conditions as an example 1 with the norbornene system ring-opening-polymerization object hydrogenation object (ZEONEKKUSU 280), and 300 closure light emitting diodes were obtained. The layer of a norbornene system ring-opening-polymerization object hydrogenation object was 0.20mm in the thinnest part, when near the boundary of the closure part of a metal leadframe and a non-closure part was removed.

[0062] With all closure light emitting diodes, the closure of the gum polymer layer was carried out into thermoplastic norbornene system resin. When energized, all closure light emitting diodes emitted light normally.

[0063] Penetration inside [of red ink] a closure object was accepted with no closure light emitting diodes as a result of the closure sex test.

[0064] When 100 closure light emitting diodes each were covered over the thermo-cycle trial of 50 cycles, 100 cycle, and 200 cycle and were energized, all closure light emitting diodes emitted light normally.

[0065] Although penetration of the red ink from the part of a metal leadframe to the interior of a closure object was accepted with a total of three closure light emitting diodes of one thing after 100 cycles, and two things after 200 cycles when the closure light emitting diode after a thermo-cycle trial was again covered over the closure sex test, penetration inside a gum polymer layer was not accepted.

[0066] Furthermore, corrosion etc. was not especially accepted although the metal leadframe of the part by which the closure is carried out to thermoplastic norbornene system resin and a gum polymer at the duplex was investigated.

[0067] As an example 4 gum polymer solution, the gum polymerization body whorl was formed in the light emitting diode chip front face like the example 3 except using the 5-% of the weight toluene solution of a styrene ethylene propylene styrene block-copolymer hydrogenation object (the Asahi Chemical make, SEPTON2043). The thickness of a gum polymer layer was 13 micrometers on the average.

[0068] It fixed in metal mold so that the closure of the part in which this gum polymer layer was formed might be carried out, and injection molding was carried out to metal mold on the same conditions as an example 1 with the norbornene system ring-opening-polymerization object hydrogenation object (ZEONEKKUSU 280), and 300 closure light emitting diodes were obtained. The layer of a norbornene system ring-opening-polymerization object hydrogenation object was 0.10mm in the thinnest part, when near the boundary of the closure part of a metal leadframe and a non-closure part was removed.

[0069] With all closure light emitting diodes, the closure of the gum polymer layer was carried out into thermoplastic norbornene system resin. When energized, all closure light emitting diodes emitted light normally.

[0070] Penetration inside [of red ink] a closure object was accepted with no closure light emitting diodes as a result of the closure sex test.

[0071] When 100 closure light emitting diodes each were covered over the thermo-cycle trial of 50 cycles, 100 cycle, and 200 cycle and were energized, all closure light emitting diodes emitted light normally.

[0072] Although penetration of the red ink from the part of a metal leadframe to the interior of a closure object was accepted by three things after 200 cycles when the closure light emitting diode after a thermo-cycle trial was again covered over the closure sex test, penetration inside a gum polymer layer was not accepted.

[0073] Furthermore, corrosion etc. was not especially accepted although the metal leadframe of the part by which the closure is carried out to thermoplastic norbornene system resin and a gum polymer at the duplex was investigated.

[0074] 300 closure light emitting diodes were obtained like the example 1 except not applying and stiffening an example of comparison 1 acrylic constituent. When the current was energized, all closure light emitting diodes emitted light normally.

[0075] Penetration inside [of red ink] a closure object was accepted with no closure light emitting diodes as a result of the closure sex test.

[0076] After the thermo-cycle trial, even if it energized the current, 3 of the thing after 50 cycles, 8 of the thing after 100 cycles, and 21 closure light emitting diodes of the thing after 200 cycles did not emit light.

[0077] When the closure light emitting diode after a thermo-cycle trial is again covered over the closure sex test, it is a thing after 50 cycles. It is a thing after six pieces and 100 cycles, and is a thing after 20 pieces and 200 cycles, and the penetration from the part of a metal leadframe inside [of red ink] a closure object was accepted with 45 closure light emitting diodes, among those penetration inside a cross-linking polymer layer was accepted by three things after 50 cycles, eight things after 100 cycles, and 19 things after 200 cycles. In addition, what penetration inside a cross-linking polymer layer was accepted in was the closure light emitting diode with which all stopped also emitting light after a thermo-cycle trial except for two things after 200 cycles.

[0078] Furthermore, when the metal leadframe of the part by which the closure is carried out to thermoplastic norbornene system resin and a cross-linking polymer at the duplex was investigated, corrosion was accepted by four things after 50 cycles, eight things after 100 cycles, and 17 things after 200 cycles. The penetration from the part of a metal leadframe inside [of red ink] a closure object is accepted after a thermo-cycle trial, and three things of them and after 50 cycles, seven things after 100 cycles, and 13 things after 200 cycles stopped emitting light, when what it is the closure light emitting diode which stopped emitting light after a thermo-cycle trial, and the remaining corrosion was accepted in removed one thing after 50 cycles.

[0079]

[Effect of the Invention] For the mold goods of this invention, the dissimilar-material part which shaping is easy since thermoplastics excellent in the moldability is used, the time amount which shaping takes is short, is excellent in the closure nature of a dissimilar material, and was embedded is a pile to a lifting

about change of oxidation etc. Moreover, interfacial peeling by the difference in the magnitude of the expansion and contraction accompanying a temperature change cannot happen easily by making the interlayer form in the front face of a dissimilar-material part.

[Translation done.]